This listing of claims replaces all prior versions and listings of the claims in the application.

In the Claims

1. (currently amended) A separation by ion implanted oxide (SIMOX) method of forming a buried oxide layer of a semiconductor-on-insulator ("SOI") substrate, comprising:

implanting a base dose including oxygen ions at a first energy level into a buried region disposed below a major surface of a semiconductor substrate to form an oxygen-implanted region;

implanting a second dose including at least one of oxygen ions or nitrogen ions into said oxygen-implanted region at a second energy level while maintaining said substrate at room temperature, said second energy level having a value ranging from 10% less than said first energy level to said first energy level; and

annealing said substrate to cause said ions implanted by said steps of implanting said base dose and said second dose to be redistributed in said substrate and to react with a material of said substrate to form a buried oxide ("BOX") layer in said oxygen-implanted region, said BOX layer electrically isolating a semiconductor layer of said substrate disposed above said BOX layer from a semiconductor region of said substrate disposed below said BOX layer, said BOX layer having superior dielectric breakdown strength per unit thickness.

2. (previously presented) The method of Claim 1 wherein said semiconductor layer of said substrate disposed above said BOX layer consists essentially of single crystal silicon and said BOX layer includes silicon dioxide.

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3-6. (cancelled)

7. (currently amended) The method of Claim 1, wherein said first energy level is about 180 keV and said second energy level is about 165 keVare in a range between about 40 KeV to about 240 KeV.

8. (currently amended) The method of Claim 1, wherein said first dose is less than or equal to $4 \times 10^{17} cm^{-2}$ second dose has a lower value than said base dose.

9-26. (cancelled)

27. (new) The method of claim 1, wherein said BOX layer has a thickness of up to 1350 angstroms and said BOX layer has a breakdown voltage of at least 75 volts.

28. (new) The method of claim 27, wherein said semiconductor layer has a thickness of up to a nominal thickness of 700 angstroms.

29. (new) The method of claim 1, wherein said second energy level is equal to said first energy level.

30. (new) The method of claim 1, wherein said base dose is about $2.5 \times 10^{17} cm^{-2}$ and said second dose is about $2.0 \times 10^{15} cm^{-2}$.